# *MUSIC LIGHTS*

## Ramsey Electronics Model No. ML1

*Watch music come alive with an entrancing, exotic display of shimmering lights. You're in control with a system you built for less than twenty dollars which rivals the performance of professional units that go for hundreds more!*

*Typical uses for the Music Lights Kit:*

- Spellbinding Holiday displays
- Super for dances and disco effects
- Great for restaurants and stores
- Very popular with Wedding and party DJs

*The Ramsey **ML1 MUSIC LIGHTS** features:*

- Operation on standard 110 VAC house current
- Three individually adjustable channels: one for highs, one for midrange and one for bass frequencies
- Controls up to 300 watts of lights per channel
- Clear, concise step-by-step instructions
- Easy hook up to any stereo or radio speaker terminals

## PARTIAL LIST OF AVAILABLE KITS

### RAMSEY TRANSMITTER KITS

- **FM25, MP3FM FM Stereo Transmitters**
- **AM1 AM Transmitter**
- **TV6 Television Transmitter**
- **FM100 Professional FM Stereo Transmitter**

### RAMSEY RECEIVER KITS

- **FR1 FM Broadcast Receiver**
- **AR1 Aircraft Band Receiver**
- **SR2 Shortwave Receiver**
- **AA7 Active Antenna**
- **SC1 Shortwave Converter**

### RAMSEY HOBBY KITS

- **SG7 Personal Speed Radar**
- **SS70A Speech Scrambler**
- **MX5, MX10 Mixers**
- **MD3 Microwave Motion Detector**
- **PH10 Peak hold Meter**
- **STC1 Stereo Transmitter Companion**

### RAMSEY AMATEUR RADIO KITS

- **FX 146 VHF Transceiver**
- **HR Series HF All Mode Receivers**
- **QRP Series HF CW Transmitters**
- **CW7 CW Keyer**
- **CPO3 Code Practice Oscillator**
- **QRP Power Amplifiers**

### RAMSEY MINI-KITS

**Many other kits are available for hobby, school, scouts and just plain FUN. New kits are always under development. Write or call for our free Ramsey catalog.**

ML1 MUSIC LIGHTS INSTRUCTION MANUAL

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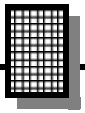

# KIT ASSEMBLY AND INSTRUCTION MANUAL FOR

# *MUSIC LIGHTS*

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## INTRODUCTION TO THE ML1 MUSIC LIGHTS KIT

One of the most popular effects to be found at music fests and concerts has to be the Color Organ, better know as Music Lights. A set of music lights will control an array of lights in a dazzling display of never ending, fascinating patterns. While not as elaborate or expensive as its professional cousins, your ML1 is just as hard working and just as fine. Don't let its small size fool you; it will easily control up to 300 watts of standard 120 VAC lights per channel, and considering that a flood light is only 150 watts, you can see that quite a display can be constructed! There are three channels which are individually controlled - one for the low audio frequencies, one for the midrange and one for the treble or high frequencies. You'll think of all sorts of uses for the ML1, from Christmas displays to disco dance parties, anywhere a festive, fun atmosphere is called for.

This kit operates on and controls the AC line voltages, so EXTREME CARE must be exercised in the building, testing and operation of this kit! At all times, treat this kit as being 'live'...after all, its not a little ol' 9 volt battery powering it! You must build it into a suitably insulated enclosure such as a plastic box or mount it thoughtfully in a metal chassis.

In keeping with our spirit of getting folks to build and learn, you'll see that your kit has easy step-by-step instructions that guide you carefully to a finished working kit. You'll not only build the kit, but learn it too!

### Building Your Kit

Most Ramsey kits can be classified as single evening kits suitable for beginners or old pros and this one is no exception. But don't let confidence get in the way of better judgment. Remember, if you solder 100 solder joints, even being right 99% of the time will still allow one error! Therefore, please take to heart these following guidelines:

- Use a comfortable pencil type soldering iron for assembly
- Keep your iron tip clean; it will then produce professional, shiny and reliable joints. Use a damp sponge to wipe your tip before every joint.
- Good lighting is a must. Why strain yourself with poor lighting?
- Take advantage of the fact that our manuals are written in stages; take a break and check your work before proceeding.
- Be on the lookout at each solder joint for a splash, bridge or errant wire lead that could prove hard to find later.

Enough said. Lets get building.....

## ML1 MUSIC LIGHTS PARTS LIST

### CAPACITORS

- ❒ 3 .01uf disc [C1,C2,C3]

### SEMICONDUCTORS

- ❒ 3 C106 SCR [D1,D2,D3]

### INDUCTORS AND TRANSFORMERS

- ❒ 1 Audio transformer [T1]

### FIXED RESISTORS

- ❒ 1 15 ohm 2 Watt resistor (brown-green-black) [R1]
- ❒ 3 10K stand-up resistors (brown-black-orange) [R5, R6, and R7] (marked L1, L2, L3 on PC board)]

### POTENTIOMETERS

- ❒ 3 10K ohm [R2,R3,R4]

### CONTROLS AND HARDWARE

- ❒ 1 Pushbutton switch [S1]
- ❒ 1 PC mount RCA phono jack [J1]
- ❒ 1 Printed circuit board [ML1]

### REQUIRED, NOT SUPPLIED

- ❒ 1 AC line cord
- ❒ 3 AC sockets
- ❒ 1 Enclosure

## ML1 CIRCUIT DESCRIPTION

The ML1 is similar to a common mounted light dimmer, except that the lamp control comes from the voltage derived from the music rather than a potentiometer. The control voltages come from three separate, simple audio filters which break the audio spectrum into individual frequency bands.

Audio signals from the speaker input are current limited by R1 and applied to transformer T1. The transformer's function is to provide isolation from the AC line and to step up the speaker voltage to insure reliable triggering of the SCRs even at low volumes. This stepped up signal level feeds the three sensitivity controls. After each control, a simple audio filter is used to tailor the response of each channel. Capacitor C1 and inductor R5 form a high pass filter, C2 and R6 form a bandpass, and C3 and R7 form a low pass filter. The frequency range of each filter is selected to provide a pleasing crossover effect for the proper control of the lighting. Each filter output drives its corresponding SCR which controls the AC load you have connected. An SCR (Silicon Controlled Rectifier) functions similar to a relay, where we can control a large load from a small signal current.

Extreme caution must be used when wiring your ML1 since the AC line is directly connected to your circuit board. Use the same care and safety techniques you'd use if you were wiring up a light or a wall outlet. Remember, that's a pretty good jolt those wires can deliver!

## KIT ASSEMBLY

Each of the following steps is complete in itself. This means that you

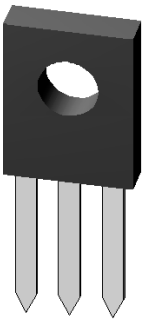
1. Identify the component called for;
2. Insert it into the proper location on the PC board;
3. Solder its leads to the PC board;
4. Carefully trim away the excess lead wire.

As you complete each step, check it off and proceed to the next step

- ❒ 1. Install switch S1 into its six holes on the PC board and solder all six pins. Ignore the other set of six solder terminals on the top of the switch.
- ❒ 2. Install T1, the audio coupling transformer. Notice that one side has some red paint or marking indicating the primary side. Install it so this side faces away from the speaker jack as shown on the parts layout diagram.
- ❒ 3. Install R2, R3, and R4, the PC mounted pots. Solder all five pins, being especially sure that the larger mounting tabs are securely soldered.
- ❒ 4. Install J1 the RCA jack.

Now that all the 'landmark' components are installed, we'll go about putting in the smaller parts. These components are spaced close together on the PC board, so pay close attention to the layout diagram so you install the right parts the first time! Also, we'll ask that you remember that install means to not only install the part, but to solder it and trim the leads as well.

- ❒ 5. Install the three stand-up resistors, marked L1, L2, and L3 on the PC board.
- ❒ 6. Install the three disc capacitors, C1, C2, and C3.
- ❒ 7. Install R1 the 15 ohm resistor. This component should be installed as a stand-up resistor with the body of the resistor toward J1. Be sure that no part of the component touches T1 as it may damage the coil and come into contact with the AC line voltage.
- ❒ 8. Examine one of the SCR devices. Look closely and you will see writing on one side. Install the SCR with the writing facing toward the front of the ML1 (toward the potentiometers). It is important that the SCRs are mounted correctly. Install the three SCRs, D1, D2, and D3.



- ❒ 9. Install jumpers JMP1, JMP2, and JMP3. These are nothing more than short scraps of component lead wire bent to fit into the PC board holes and soldered into place. Their function is to act as a 'bridge' over the circuit board traces running underneath them.

This completes the assembly of the electronic component portion of your ML1. Now is a good time to not only sit back and admire your work but to carefully examine all solder joints and placement of the components. Be sure all excess leads are trimmed away and touch up any solder joints that don't appear perfect. You may wish to brush the solder side of the PC board with a stiff brush to make sure that no loose lead trimmings or solder drippings are lodged between connections. It's better for the ego to find an error now before power is applied!

**Final assembly**

Final assembly is almost entirely determined by what sort of enclosure you have selected to put your ML1 into. If you've selected small single AC outlets, a plastic project from Radio Shack will do. If you decided to use a standard AC wall style duplex outlet, then a larger box will have to be used. In either case, you'll see that the PC board has convenient corner mounting holes to hold your board. You should mount the board near the front of your case since this will allow the PC board mounted controls to stick through the front for easy adjustment. Be cautious to ensure that no metal part of these controls can be touched from the outside of your case. Remember that the circuit is connected to one side of the AC line and could produce a nasty shock or worse to an unsuspecting person. All this aside, let's proceed:

- ❑ Mount your selected AC outlets to the rear of your case.
- ❑ Install your AC line cord through a suitable hole and strain relief device ( a grommet with a knot tied in the cord inside the case or something similar).
- ❑ Select a convenient location in which to mount your finished PC board, but do not install it yet.
- ❑ Drill or punch the appropriate mounting holes for the PC board and make clearance holes for the controls.
- ❑ Check your placement to ensure that no metal or wiring will be exposed when the case is 'buttoned up'.
- ❑ Solder a set of wires from each outlet to the proper holes on the PC board - High light to P1 and P2, Mid light to P3 and P4, and Low light to P5 and P6.
- ❑ Solder your line cord to holes P7 and P8 on the PC board. Carefully examine all wiring for shorts, frayed strands or bad joints.

## Testing and Operation

To properly test your ML1 Music Lights, you will need these basic tools and equipment:

- A source of audio or music such as a stereo or radio
- Three 110 VAC lamps less than 300 watts each
- An RCA phono plug with wires to connect to your audio source.

Connect a pair of wires from the speaker input jack on your ML1 to the speaker terminal on the audio source you have selected.

- Plug the three lamps you wish to control into the ML1.
- Check to make sure that no wiring is exposed unsafely or metal touching you or some object on the work table.
- Plug in the line cord from your Music Lights.
- Connect your audio source to the ML1. You can hook the input up in parallel with your speaker if you wish.
- Advance the volume control on your stereo for a moderate level.
- Adjust each control on the kit for the desired display of lights. If you cannot get the lights to light up fully, turn up the volume on your stereo. In most cases, a moderate listening level is adequate.
- Once again, make a safety check and 'button-up' your enclosure.

## Using the ML1 Within the Home

The most popular use of the ML1 is to hook it up to your stereo and produce an enticing light show. This is especially nice during the Holiday season, controlling Christmas tree lights on the house or tree from a selection of seasonal music. Party atmospheres are also enhanced by such a display. But, how about some unique ideas? One customer uses it in a speech class to help speech students see what words should look like. Another uses his ML1 to 'see' the phone ring. Of course, quite a few have added to their goodie budgets by selling nicely made units to local DJs that do parties, receptions and reunions. You'll discover your own uses, too.

## Troubleshooting hints

If your ML1 does not work at all, re-check the following:

- Correct orientation of all SCRs
- Correct parts placement: "That's not a jumper where a capacitor should be, is it?"
- Correct transformer installation. The red side should be facing away from J1.
- Is there enough speaker volume driving the ML1? Try turning up the volume on your audio source.
- All solder connections

Please check your work carefully. 95% of kit problems are related to assembly errors.

# *The Ramsey Kit Warranty*

**Please read carefully BEFORE calling or writing in about your kit. Most problems can be solved without contacting the factory.**

Notice that this is not a "fine print" warranty. We want you to understand your rights and ours too! All Ramsey kits will work if assembled properly. The very fact that your kit includes this new manual is your assurance that a team of knowledgeable people have field-tested several "copies" of this kit straight from the Ramsey Inventory. If you need help, please read through your manual carefully, all information required to properly build and test your kit is contained within the pages!

**1. DEFECTIVE PARTS:** It's always easy to blame a part for a problem in your kit, Before you conclude that a part may be bad, thoroughly check your work. Today's semiconductors and passive components have reached incredibly high reliability levels, and it's sad to say that our human construction skills have not! But on rare occasions a sour component can slip through. All our kit parts carry the Ramsey Electronics Warranty that they are free from defects for a full ninety (90) days from the date of purchase. Defective parts will be replaced promptly at our expense. If you suspect any part to be defective, please mail it to our factory for testing and replacement. Please send only the defective part (s), not the entire kit. The part(s) MUST be returned to us in suitable condition for testing. Please be aware that testing can usually determine if the part was truly defective or damaged by assembly or usage. Don't be afraid of telling us that you 'blew-it', we're all human and in most cases, replacement parts are very reasonably priced.

**2. MISSING PARTS:** Before assuming a part value is incorrect, check the parts listing carefully to see if it is a critical value such as a specific coil or IC, or whether a RANGE of values is suitable (such as "100 to 500 uF"). Often times, common sense will solve a mysterious missing part problem. If you're missing five 10K ohm resistors and received five extra 1K resistors, you can pretty much be assured that the '1K ohm' resistors are actually the 'missing' 10 K parts ("Hum-m-m, I guess the 'red' band really does look orange!") Ramsey Electronics project kits are packed with pride in the USA. If you believe we packed an incorrect part or omitted a part clearly indicated in your assembly manual as supplied with the basic kit by Ramsey, please write or call us with information on the part you need and proof of kit purchase

**3. FACTORY REPAIR OF ASSEMBLED KITS:**
To qualify for Ramsey Electronics factory repair, kits MUST:
1. NOT be assembled with acid core solder or flux.
2. NOT be modified in any manner.
3. BE returned in fully-assembled form, not partially assembled.
4. BE accompanied by the proper repair fee. No repair will be undertaken until we have received the MINIMUM repair fee (1/2 hour labor) of $25.00, or authorization to charge it to your credit card account.
5. INCLUDE a description of the problem and legible return address. DO NOT send a separate letter; include all correspondence with the unit. Please do not include your own hardware such as non-Ramsey cabinets, knobs, cables, external battery packs and the like. Ramsey Electronics, Inc., reserves the right to refuse repair on ANY item in which we find excessive problems or damage due to construction methods. To assist customers in such situations, Ramsey Electronics, Inc., reserves the right to solve their needs on a case-by-case basis.

The repair is $50.00 per hour, regardless of the cost of the kit. Please understand that our technicians are not volunteers and that set-up, testing, diagnosis, repair and repacking and paperwork can take nearly an hour of paid employee time on even a simple kit. Of course, if we find that a part was defective in manufacture, there will be no charge to repair your kit (But please realize that our technicians know the difference between a defective part and parts burned out or damaged through improper use or assembly).

**4. REFUNDS:** You are given ten (10) days to examine our products. If you are not satisfied, you may return your unassembled kit with all the parts and instructions and proof of purchase to the factory for a full refund. The return package should be packed securely. Insurance is recommended. Please do not cause needless delays, read all information carefully.

**ML1 MUSIC LIGHTS KIT**
**Quick Reference Page Guide**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**REQUIRED TOOLS**

- Soldering Iron Ramsey WLC100
- Thin Rosin Core Solder Ramsey RTS12
- Needle Nose Pliers Ramsey MPP4 or RTS05
- Small Diagonal Cutters Ramsey RTS04

<OR> Technician's Tool Kit TK405

**ADDITIONAL SUGGESTED ITEMS**

- Holder for PC Board/Parts Ramsey HH3
- Desoldering Braid Ramsey RTS08
- Digital Multimeter Ramsey M133

**TOTAL SOLDER POINTS**
**80**
**ESTIMATED ASSEMBLY TIME**

**Beginner ..... 2.3 hrs**
**Intermediate ..... 1.3 hrs**
**Advanced ..... 1.0 hrs**

Manual Price Only: $5.00
Ramsey Publication No. ML1
Assembly and Instruction manual for:
***RAMSEY MODEL NO. ML1 MUSIC LIGHTS KIT***


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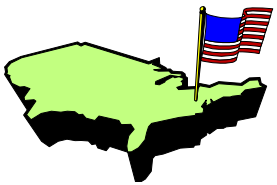

This Quality Electronics Kit was designed and packed in the USA